ANNALS OF CARNEGIE MUSEUM
VOL. 63, NUMBER 1, P. 67–75 22 FEBRUARY 1994

FIVE NEW SPECIES OF *HYDROPTILA* FROM EASTERN UNITED STATES (INSECTA: TRICHOPTERA: HYDROPTILIDAE)

JAN L. SYKORA
Research Associate, Section of Invertebrate Zoology

STEVEN C. HARRIS[1]
Research Associate, Section of Invertebrate Zoology

ABSTRACT

Five new species of *Hydroptila* from the eastern United States similar to *H. strepha* Ross are described and figured: *Hydroptila antennopedia* and *H. parachelops* from Pennsylvania, New Hampshire, and Maine; *H. morsei* from South Carolina, Texas, and Florida; *H. blicklei* from Maine; *H. holzenthali* from Mississippi. Male genitalia of *H. strepha,* determined to occur only in Pennsylvania and West Virginia, are illustrated.

INTRODUCTION

The United States Army Corps of Engineers (Pittsburgh District) has supported our ongoing study of caddisflies in reservoir tailwaters of the upper Ohio River drainage basin. As part of this project, ultraviolet light traps were operated monthly from May through October at the outflow from Youghiogheny River Lake in southwestern Pennsylvania (J. L. Sykora, unpubl. reports to U.S. Army Corps of Engineers). Of the more than 100 species collected, two were tentatively identified as *Hydroptila strepha* Ross. Comparisons of the genitalia of the specimens collected from the Youghiogheny River to the figures of *H. strepha* suggested differences, prompting an examination of the holotype of *H. strepha* collected from the Susquehanna River in Pennsylvania. Close examination indicated that the specimens from the Youghiogheny River represented two new species closely related to *H. strepha* and other members of the *H. consimilis* group of Marshall (1979).

The discovery of two new species similar to *H. strepha* suggested that reexamination of the species was in order. The question of the identity of *H. strepha* was reinforced by the unusual distribution pattern for the species, with records from the northeastern United States, Minnesota, Mississippi, Texas, and South Carolina. Therefore, an effort was made to secure additional *H. strepha* material. Collections of specimens identified as *H. strepha* and related species were obtained from the University of New Hampshire, Clemson University, Illinois Natural History Survey, National Museum of Natural History, University of North Texas, University of Tennessee, and University of Minnesota. Specimens from these collections were compared with the holotype of *H. strepha* resulting in the identification of three additional new species: one from Mississippi; one from Maine; and another from South Carolina, Texas, and Florida. The material available to us indicates *H. strepha* is known only from Pennsylvania and West Virginia.

The genus *Hydroptila* is the largest and most successful of the family Hydrop-

[1] Department of Biology, Clarion University, Clarion, Pennsylvania 16214.
Submitted 9 April 1993.

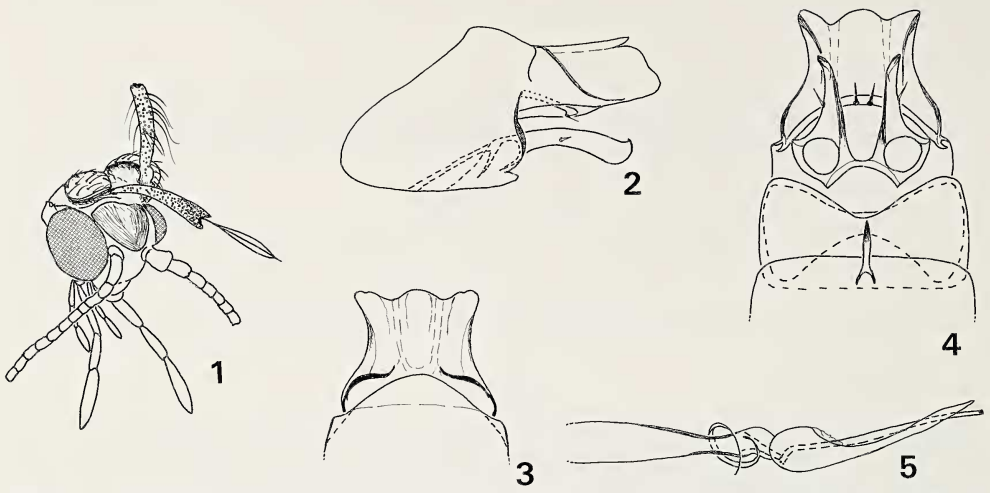

Fig. 1–5.—*Hydroptila antennopedia,* new species: 1, head of paratype; 2, male genitalia, lateral view; 3, tenth abdominal segment, dorsal view; 4, male genitalia, ventral view; 5, phallus, dorsal view.

tilidae with world-wide, cosmopolitan distribution (excluding polar regions). Marshall (1979) estimated that this genus included over 150 species worldwide. Since that time, many more species have been described from different parts of the world. Up to 1979, 60 species were recorded by Blickle (1979) in the continental United States, a number that has been constantly growing. Of these new species many were discovered in the southern United States. At present, 95 *Hydroptila* species are known from the continental United States, 72 of which are described from the eastern United States and, according to Masteller and Flint (1992), 27 species of *Hydroptila* are known from Pennsylvania.

Marshall (1979) recognized several species-groups which are characterized by male genitalia. Species described in this paper are members of the widely distributed *consimilis* group. Terminology utilized in the descriptions follows that of Marshall (1979).

Specimens are deposited at the Carnegie Museum of Natural History (CMNH), the Department of Entomology, Clemson University (CU), the Department of Entomology, University of New Hampshire (NH), the Illinois Natural History Survey (INHS), the University of Minnesota (UM), the National Museum of Natural History (NMNH), or in the junior author's collection (SCH).

Hydroptila antennopedia, new species
(Fig. 1–5)

Diagnosis.—This species is distinguished from any other known species of *Hydroptila* by a combination of features in the male genitalia. Segment X is trilobed; the inferior appendages expand gradually toward a rounded apex with a dorsoapical point; and the apical section of the phallus is divided posteriorly into two sections of equal length.

Description.—Male: Length 2.1 mm. Antennae 34-segmented. Color brown in alcohol. Sternite of abdominal segment VII with short, pointed process; segment VIII annular, quadrate from lateral view; segment IX with blunt, broad dorsal lobe, and a narrow mediolateral projection. Dorsal aspect of segment X broad, three-lobed with central lobe rounded at apex, lateral aspect almost rectangular with oblique apical margin. Subgenital plate shorter than inferior appendages, rounded at apex and

bearing two short spines close to the apical margin. Inferior appendages in lateral view with slightly sinuate ventral and dorsal margins, expanding into a ventrally rounded apex with a distinct dorsoapical point; ventral aspect with a quadrangular broad base and narrow, triangular apical section. Phallus relatively short, distal section divided into two narrow, long processes, the dorsal one produced from a broad cup-shaped base, the ventral process a rod-shaped continuation of the ejaculatory duct; short paramere arising anteriorly of neck making full revolution.

Female.—Unknown.

Type Specimens.—Holotype, male (CMNH): PENNSYLVANIA, Fayette Co., Youghiogheny River Lake outflow near Confluence, June 17–18, 1991, light trap. Paratypes: The specimens made available to us and identified as *H. antennopedia* included many examples from Pennsylvania, New Hampshire, Maine, and one specimen from Minnesota. PENNSYLVANIA, Fayette Co., Youghiogheny River Lake outflow near Confluence 1 male (SCH); same August 24–25, 1991, 1 male (CMNH); Forest Co., Otter Run, July 1, 1990, E. C. Masteller, 5 males; Warren Co., 2 mi S Warren, 25 June 1987, O. S. Flint, Jr., 2 males (NMNH). MAINE, Allagash, July 5, 1959, 5 males; same July 6, 1959, 4 males; same July 8, 1959, 2 males; same July 10, 1959, 40 males; same July 13, 1959, 8 males; same July 19, 1959, 39 males; same July 22, 1959, 17 males; same July 23, 1959, 9 males; same July 24, 1959, 4 males; same July 25, 1959, 21 males; same July 26, 1959, 69 males; same July 27, 1959, 22 males; same July 29, 1959, 90 males; same July 30, 189 males; same August 1, 1959, 186 males; same August 2, 1959, 1 male. Dennistown, July 22, 1959, 1 male; same August 27, 1959, 1 male; Kingfield, August 13, 1964, 40 males; Round Pond, July 13, 1959, 1 male (NH); Allagash, July 13, 1959, 1 male; same July 29, 1959, 1 male; same August 1, 1959, 10 males; same August 2, 1959, 11 males; Big Black River, July 25, 1961, A. Brower, 120 males; Oxbow, July 22, 1961, A. Brower, 1 male (NMNH). MINNESOTA, Finland Co., July 25, 1965, D. Etnier, 1 male (UM). NEW HAMPSHIRE, Colebrooke, July 17–24, 1957, 2 males; same July 10–17, 1957, 1 male (NH).

Remarks.—One paratype of *H. antennopedia* bears a pair of thin, leg-like appendages extending from beneath the "scent caps" (Fig. 1). According to Schmid (1980) who illustrated similar appendages in *H. ampoda,* these erectile organs may carry androconia in the setae or scales with odoriferous function. This new species is placed near *H. strepha* Ross (1941) based on the trilobed segment X and the short, pointed apical sections of the phallus. It differs in the shape of inferior appendages which are tubular in *H. strepha,* but club-shaped in *H. antennopedia.* All the specimens designated as paratypes from Maine were previously identified as *H. strepha* (Blickle, 1964). Morse and Blickle (1957) also reported *H. strepha* from New Hampshire. Based on our reexamination, it is quite possible that *H. strepha* does not occur in New Hampshire and Maine. The material available to us indicates that *H. strepha* is known from the original locality in north-central Pennsylvania (Susquehanna River) and West Virginia (Pendleton County, Smoke Hole State Park, Briggs Run, April 9, 1977, Don and Mignon Davis, Det. Flint; Pendleton County, Smoke Hole Camp, May 14, 1963, Field and Flint, 1 male). As considerable confusion exists in the identity of *H. strepha,* the species is redrawn from the type (Fig. 6–9).

Etymology.—Latin, meaning leg-like antennae.

Hydroptila parachelops, new species
(Fig. 10–13)

Diagnosis.—This species is distinguished by a combination of several morphological characters of male genitalia. These include the trilobed segment X with

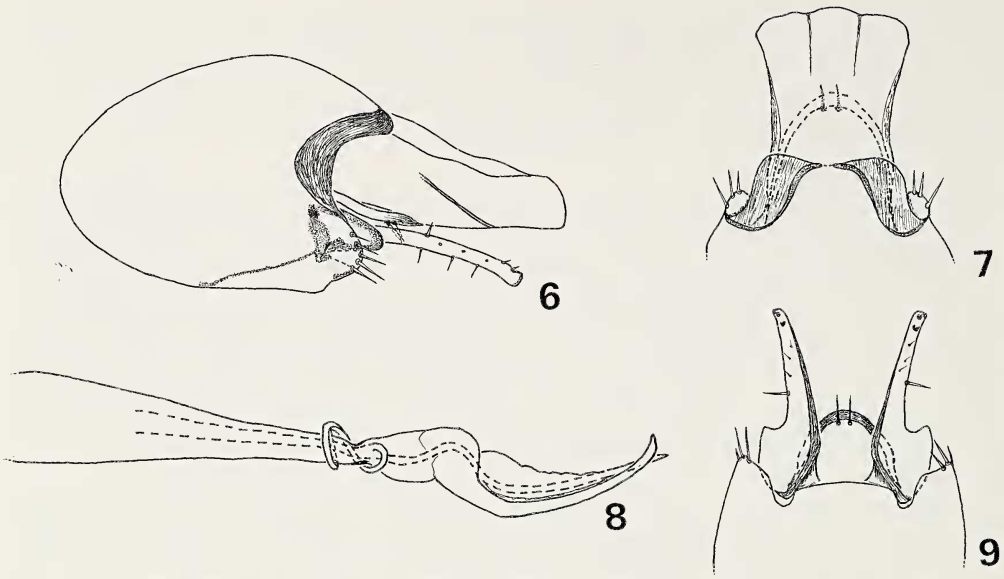

Fig. 6–9.—Male genitalia of *Hydroptila strepha* Ross: 6, lateral view; 7, tenth abdominal segment, dorsal view; 8, phallus, dorsal view; 9, inferior appendages, ventral view.

very small central lobe and large lateral lobes, ventrally curved, tubular inferior appendages and long, biramose apical section of the phallus.

Description.—Male: Length 3.0 mm. Antenna 29-segmented. Brown in alcohol. Sternite of segment VII with short, pointed apicomesal process; segment VIII tubular with straight apical margins and covered with sparse setae; segment IX emarginate ventrally and dorsally with relatively short ventrolateral extensions; segment X with dorsal aspect wide at the base and slightly narrowed at the excised, flared apex; central lobe small and membranous, lateral sections slightly sclerotized, wide in the middle, tapering posteriorly. Inferior appendages from lateral view almost tube-shaped, long and narrow, curved ventrally, with slightly enlarged distal section, and rounded apex; ventral view triangular with broad base and straight mesal margins, the distal section rapidly tapering towards obtuse apex with small, sclerotized lateral point. Subgenital plate round with sclerotized ventral "strip" bearing two setae and a membranous dorsal section. Phallus with relatively short base, forked distal section; dorsal portion heavily sclerotized and curved with apex pointed ventrally; ventral branch narrow, parallel-sided, lightly sclerotized and bent at the base; neck with paramere making at least one full revolution, ejaculatory duct sinuous in neck, continuing into ventral branch of the phallus.

Female.—Unknown.

Type Specimens.—Holotype, male (CMNH): PENNSYLVANIA, Fayette Co., Youghiogheny River Lake outflow near Confluence, Pennsylvania, August 24–25, 1991, light trap. Paratypes: same, 1 male (SCH); MAINE, Dennistown, July 31, 1959, 5 males (INHS); same, July 19, 1959, 2 males; same July 25, 1959, 13 males; Oquossoc, July 28, 1959, 1 male; same July 30, 1959, 2 males; same July 31, 1959, 1 male (NH).

Remarks.—*Hydroptila parachelops* is closely related to *H. strepha* Ross (1941) and *H. chelops* Harris (1985), on the basis of trilobed segment X, tube-shaped inferior appendages, and forked distal section of phallus with curved apex. It differs from the latter in the shape of forked phallus which has only one sclerotized apical branch. From the former it could be distinguished by the triangular, ventral aspect of inferior appendages with straight mesal margins similar to *H. arctia*

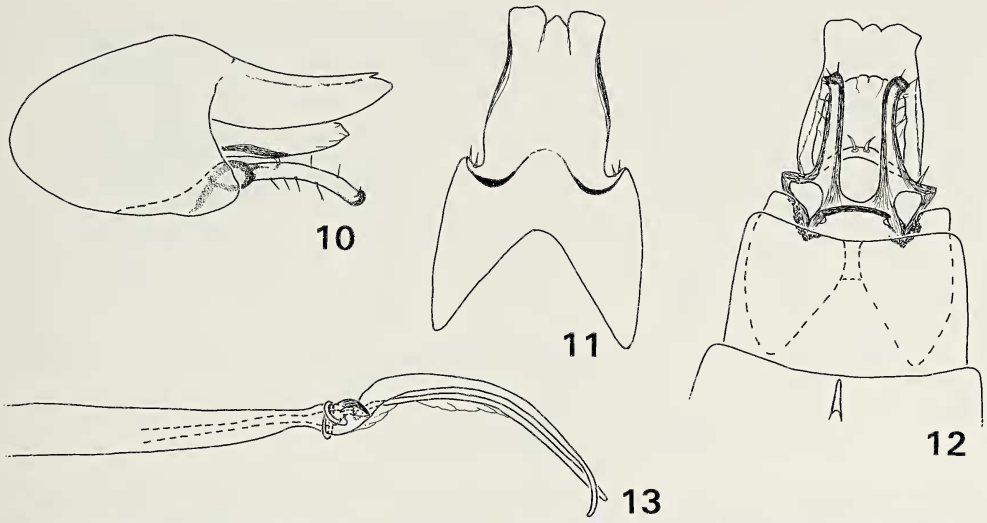

Fig. 10–13.—Male genitalia of *Hydroptila parachelops,* new species: 10, lateral view; 11, tenth abdominal segment, dorsal view; 12, ventral view; 13, phallus, dorsal view.

Ross (1938). Those specimens of *H. parachelops* collected in Maine and obtained from the Illinois Natural History Survey and the University of New Hampshire collections were previously identified as *H. strepha.*

Etymology.—Latin, close to *chelops.*

Hydroptila morsei, new species
(Fig. 14–17)

Diagnosis.—This species is characterized by male genitalia with segment IX extended anteriorly into a ligament attached to segment VIII, trilobed segment X bearing sickle-shaped lateral lobes, rod-shaped inferior appendages and membranous apex of phallus with sinuous tip.

Description.—Male: Length 2.1 mm. Antennae 28-segmented. Color light brown in alcohol. Venter of abdominal segment VII with short apicomesal projection; segment VIII tubular with rounded posteroventral edges. Segment IX recessed within segment VIII, in lateral aspect rounded anteriorly with anteroventral margin extended into sclerotized ligament-like section attached to the posteroventral margin of segment VIII. Dorsal aspect of segment X trilobed with broad central lobe and sclerotized lateral lobes flared and sickle-shaped; in lateral view broadly truncate with apex of the lateral lobes upturned. Subgenital plate membranous and extending over the midlength of inferior appendages, rounded apically and bearing two short setae. Inferior appendages in lateral aspect almost as long as segment X, rod shaped, in ventral view each with broad triangular base with short lateral spines. Phallus with proximal section broad and slightly longer than the distal portion; distal section membranous with a slightly curved tip and bulbous base encircled by a short spiral paramere making one full revolution.

Female.—Unknown.

Type Specimens.—Holotype, male (CU): SOUTH CAROLINA, Dorchester Co., Four Holes Swamp, Goodsons Lake, 13 August 1976, J. Morse. Paratypes: same, 4 males (3 males in CU, 1 male in SCH); Berkeley Co., Four Holes Swamp, Mims Lake, 7 May 1976, J. Morse, 2 males (1 male in CU, 1 male in CMNH); TEXAS, Hardin Co., Cypress Creek, off TX 326, N. Kountze, UV light, October 23, 1992, Moulton and Alexander, 6 males; Hardin Co., Hickory Creek, off US

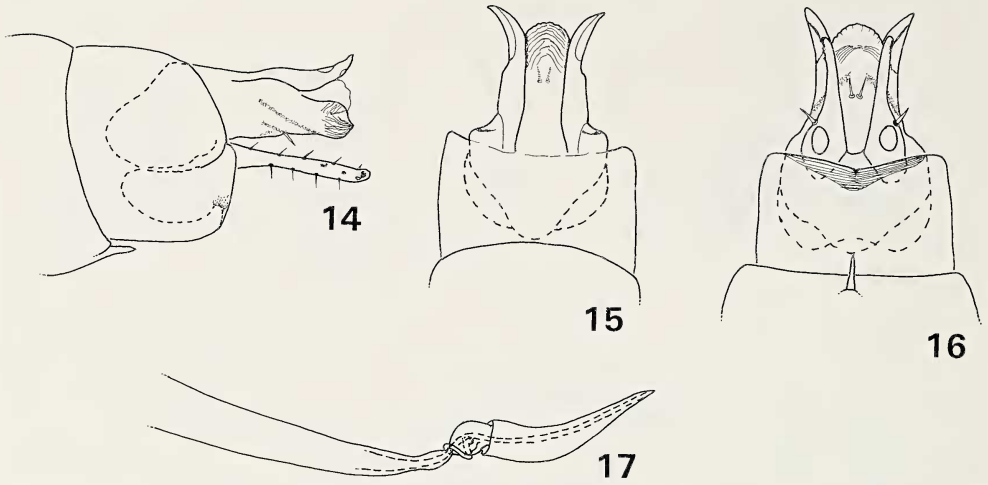

Fig. 14–17.—Male genitalia of *Hydroptila morsei,* new species: 14, lateral view; 15, dorsal view; 16, ventral view; 17, phallus, dorsal view.

287/69, N. Kountze, October 23, 1992, UV light, Moulton and Alexander, 1 male (SCH); FLORIDA, Highlands Co., Archbold Biological Station, March 6, 1964, S. W. Frost, 2 males (NMNH).

Remarks.—*Hydroptila morsei* is closely related to *H. strepha* Ross (1941) but it is distinguished by the shape of segment X and the phallus. In *H. morsei,* the distal portion of the tenth segment is characterized by well-developed lateral lobes separated from a large central section by deep incisions while in *H. strepha* these incisions are shallow and the central section is small. In *H. strepha* the distal portion of the phallus has a broad, sclerotized base extending into the lateral, chitinized margin with a membranous lateral part. In *H. morsei* the section surrounding the ejaculatory duct is entirely membranous. This species was collected from five sites located in South Carolina, Texas, and Florida. It was not recorded by Harris et al. (1991) from Alabama and its distribution in the southern United States remains unclear.

Etymology.—Named in honor of Dr. John Morse who collected this species.

Hydroptila blicklei, new species
(Fig. 18–21)

Diagnosis.—The male of this species is characterized by the combination of several characters. The inferior appendages are wide at the base extending distally to pointed, divergent apices; segment X is trilobed with rounded central lobe slightly protruding dorsad and a pair of pointed, divergent lateral lobes; ventral aspect of subgenital plate with "X"-shaped sclerotized central section; phallus membranous with a short spiral paramere.

Description.—Male: Length 2.1 mm. Antennae broken off. Color yellowish-brown in alcohol. Sternite of abdominal segment VII with short, pointed apicomesal process; segment VIII generally quadrate with slightly excised posteroventral margin and rounded ventrolateral aspect; segment IX retracted into VIII, triangular from lateral view with spoon-shaped ventral extensions and incised posteroventral margin; apex of segment X divided into three lobes, a membranous apically rounded mesal lobe and a pair of sharp sickle-shaped lateral lobes; subgenital plate from lateral view partially sclerotized,

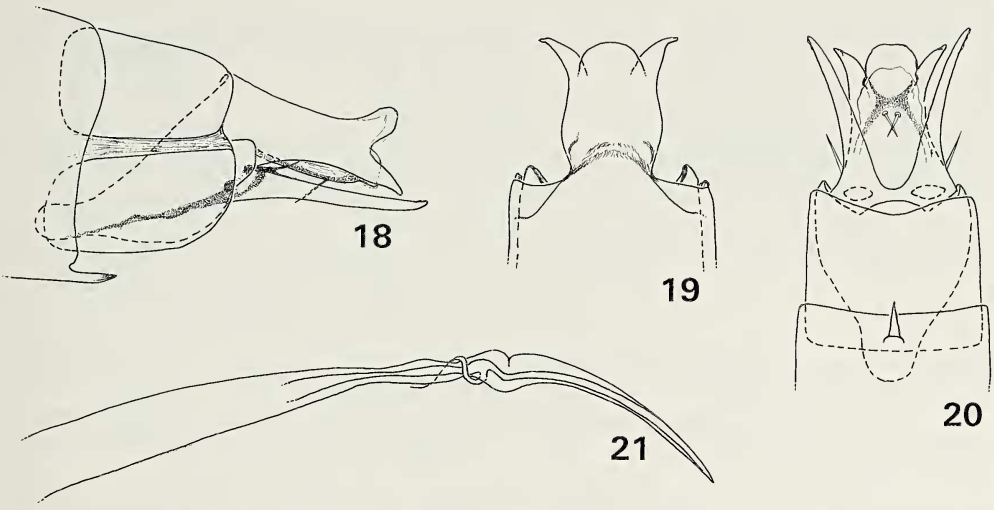

Fig. 18–21.—Male genitalia of *Hydroptila blicklei,* new species: 18, lateral view; 19, tenth abdominal segment, dorsal view; 20, ventral view; 21, phallus, dorsal view.

almost as long as segment X and extending over midlength of inferior appendages, ventrally with "X"-shaped, sclerotized section, bearing a pair of setae centrally; inferior appendages longer than segment X, in lateral view elongated, narrowly triangular and gradually tapering toward pointed tips, in ventral aspect with a broad base extending into blade-shaped apices diverging distally; phallus curved ventrally, central portion narrow tapering to a long neck, distal section membranous almost triangular from dorsal view with slightly curved apex, ejaculatory duct sinuous in the neck and continuing through the apical, membranous section with a slender, spiral paramere arising anteriorly of neck making slightly more than one full revolution.

Female.—Unknown.

Type Specimens.—Holotype, male (NH): MAINE, Dennistown, July 29, 1959. Paratypes: MAINE, Oquossoc, July 31, 1959, 1 male (NH); Oxbow, July 22, 1961, A. Brower, 10 males (NMNH).

Remarks.—This species is another member of the *H. consimilis* group closely related to *H. strepha* Ross (1941) and *H. roberta* Hamilton and Holzenthal (1986). It differs from the former by the lateral aspect of inferior appendages which are straight in *H. blicklei* and curved in *H. strepha.* From the latter it could be distinguished by the phallus with spiral paramere, trilobed tenth segment with membranous mesal section and by segment IX with spoon-shaped anteroventral section. These specimens collected by Dr. A. E. Brower were made available to us by Dr. J. S. Weaver, Jr. III and Dr. O. S. Flint, Jr. They were originally identified as *H. strepha* (Blickle, 1964).

Etymology.—Named for Dr. R. L. Blickle who first studied this species.

Hydroptila holzenthali, **new species**
(Fig. 22–25)

Diagnosis.—The male of this species is characterized by the combination of several characters, including bilobed segment X, triangular subgenital plate with two apical lobes bearing terminal setae, wedge-shaped inferior appendages, and the very long, thin and tubular phallus.

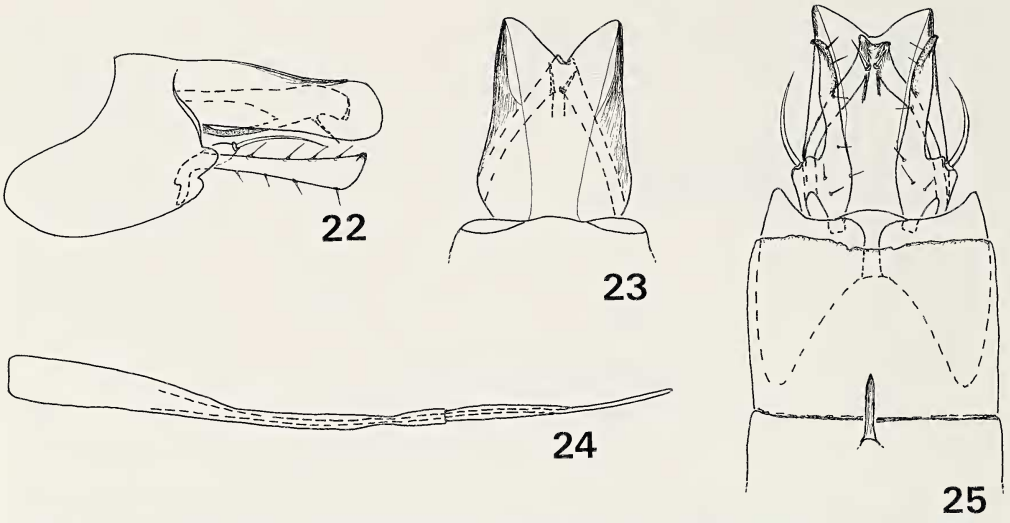

Fig. 22–25.—Male genitalia of *Hydroptila holzenthali,* new species: 22, lateral view; 23, tenth abdominal segment, dorsal view; 24, phallus, dorsal view (40% reduction); 25, ventral view.

Description.—Male: Length 3 mm, antennae broken off, color light brown in alcohol. Posteroventral margin of segment VII with short apicomesal process. Segment VIII tubular, posteroventral margin irregular with rounded posteroventral corners. Segment IX heavily sclerotized, in lateral view with rounded anteroventral section extending deeply into segment VIII; dorsal and ventral aspects widely incised. Segment X in dorsal view bilobed, lobes flared, in lateral view rectangular and broad with rounded apex. Subgenital plate membranous, triangular, incised in the middle, almost as long as inferior appendages, apex divided into two short lobes bearing two setae. Inferior appendages almost as long as segment X, in lateral view wedge-shaped, with posteroventral corners rounded, dorsal margin ending in small posterodorsal point; in ventral view widely separated at broad, shouldered quadrangular bases with a long and prominent seta located at rounded posterolateral corner. Tubular phallus very long, extending over more than three segments, with funnel-shaped base constricted at midlength without spiral paramere and with one third of ejaculatory duct protruding freely from membranous sheath.

Female.—Unknown.

Type Specimen.—Holotype, male (CU): MISSISSIPPI, Stone Co., Flint Creek, Hwy 26, 7.9 km E Wiggins, 7 June 1979, Col. R. W. Holzenthal.

Remarks.—The holotype of this species was collected in Mississippi and originally identified as *H. strepha* (Harris et al., 1982). *Hydroptila holzenthali* is closely related to *H. quinola* Ross (1947). It is distinguished by the absence of defined thumb-like projections on the base of inferior appendages, and a membranous and quadrangular subgenital plate. In addition, the apices of inferior appendages in *H. holzenthali* are slightly hooked while in *H. quinola* the apices are rounded.

Etymology.—Named for Dr. Ralph W. Holzenthal, University of Minnesota who collected the holotype.

ACKNOWLEDGMENTS

This project was supported by contract DACW 5991M0705 from the U.S. Army Corps of Engineers, Pittsburgh District, Pittsburgh, Pennsylvania. Special thanks go to J. M. Fowles and M. Koryak from the U.S. Army Corps of Engineers for their assistance in the selection of sites, logistics of sample collection, and critical review of the manuscript. We also acknowledge the help of O. S. Flint, Jr., National Museum of Natural History, J. Morse, Clemson University, and J. S. Weaver, Jr. III, who

provided us with additional specimens of *Hydroptila*. The type of *H. strepha* was loaned for use in this study by the Illinois Natural History Survey.

LITERATURE CITED

BLICKLE, R. L. 1964. Hydroptilidae (Trichoptera) of Maine. Entomological News, 75(6):159–162.

———. 1979. Hydroptilidae (Trichoptera) of America north of Mexico. New Hampshire Agriculture Experiment Station, University of New Hampshire, Durham, New Hampshire, Station Bulletin 506, 97 pp.

HAMILTON, S. W., AND R. W. HOLZENTHAL. 1986. Two new species of caddisflies from Georgia (Trichoptera: Polycentropodidae, Hydroptilidae). Proceedings of the Entomological Society of Washington, 88(1):163–166.

HARRIS, S. C. 1985. New Hydroptilidae (Trichoptera) from Alabama. Journal of the Kansas Entomological Society, 58(2):248–253.

HARRIS, S. C., P. G. LAGO, AND R. W. HOLZENTHAL. 1982. An annotated checklist of the caddisflies (Trichoptera) of Mississippi and southeastern Louisiana. Part II: Rhyacophiloidea. Proceedings of the Entomological Society of Washington, 84(3):509–512.

HARRIS, S. C., P. E. O'NEIL, AND P. K. LAGO. 1991. Caddisflies of Alabama. Bulletin of the Geological Survey of Alabama, 142:1–442.

MARSHALL, J. E. 1979. A review of the genera of the Hydroptilidae (Trichoptera). Bulletin of the British Museum of Natural History (Entomology), 39(3):135–239.

MASTELLER, E. C., AND O. S. FLINT, JR. 1992. Trichoptera Biodiversity of Pennsylvania. 2nd ed. [Report to Pennsylvania Fish Commission.] 2 volumes, 67 pp.

MORSE, W. J., AND R. L. BLICKLE. 1957. Additions and corrections to the New Hampshire list of Trichoptera. Entomological News, 68:127–131.

ROSS, H. H. 1938. Description of Nearctic caddis flies (Trichoptera). Bulletin of the Illinois Natural History Survey, 21(4):101–183.

———. 1941. Description and records of North American Trichoptera. Transactions of the American Entomological Society, 67:35–126.

———. 1947. Descriptions and records of North American Trichoptera with synoptic notes. Transactions of the American Entomological Society, 73:125–168.

SCHMID, F. 1980. Genera des Trichopteres du Canada et des Etats adjacent. Les Insectes et Arachnides du Canada, Partie 7. Agriculture Canada, Ottawa, 296 pp.